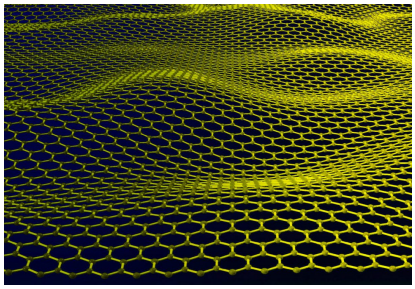


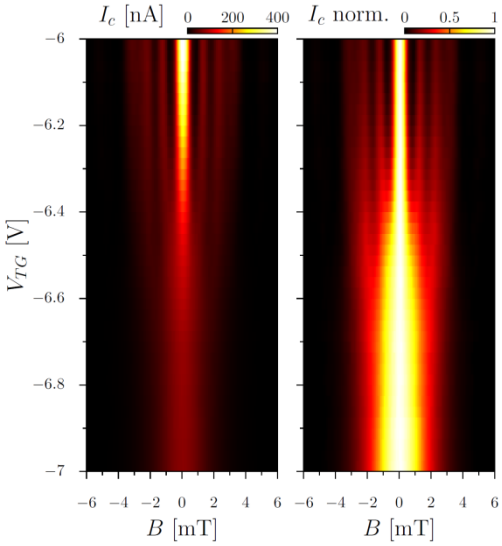
Karlsruhe Institute of Technology

TECHNISCHE UNIVERSITÄT DARMSTADT

Master Thesis on Induced Superconductivity in Graphene

We offer a master thesis based on the study of induced superconductivity in graphene in the research unit of Prof. Krupke at the Institute of Nanotechnology.

By placing graphene between hexagonal boron nitride, one can produce high quality devices called van der Waals heterostructures [1], in which charge carrier transport is ballistic. When graphene is connected to superconducting leads, a dissipationless current (called supercurrent) can flow through the device [2-4]. In this project, we study the limit of this induced superconductivity in ballistic graphene, that is to say the maximum distance over which the supercurrent can be measured. The effect will be probed by quantum transport and magnetic interferometry experiments.



What you will learn

You will develop new electronic devices using graphene as a base material and investigate their fundamental physical properties. You will learn the use of the equipment and facilities of the Institute for Nanotechnology (electron beam lithography, ultra-high vacuum deposition systems, low-noise electrical measurement at cryogenic temperatures, Raman spectroscopy, etc.) and will benefit from a strong theoretical support. Our work is supported by the DFG.

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References

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[3] Allen et al., Nature Phys. 12, 128 (2016).

[4] Ben Shalom et al., Nature Phys. 12, 318 (2016).